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"RF Receivers And Methods"  
Atty. Docket No. CS11336

Appl. No. 09/998,489  
Examiner R. Perez Gutierrez  
Art Unit 2683

## REMARKS

### Request for Reconsideration/Re-Open Prosecution, Claims Pending

The Answer mailed on 13 January 2005 has been considered carefully. Reconsideration of the referenced application is respectfully requested.

Kindly re-open prosecution under 37 CFR 41.39 in light of the new grounds for the rejections.

Claims 1-10 stand allowed. Claim 15 and 23 are canceled.

Claims 1-14, 16-22 and 23-27 are pending.

### Allowability of Claims 11, 13, 14, 18, 24 & 26

#### Rejection Summary

Claims 11, 13, 14, 18 & 24 now stand rejected on new grounds Under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Appl. Pub. No. 2001/0039182 (Atkinson) in view of Mouly et al.

#### Discussion of Claim 11

Claim 11 has been amended to include limitations of Claim 13. Contrary to the Examiner's assertion, Atkinson and Mouly et al. do not disclose or suggest a

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... method in intermediate frequency and direct conversion receivers, comprising:  
receiving a signal;  
providing a mixer injection frequency by dividing a voltage controlled oscillator output by a frequency divide ratio,  
the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics;  
mixing the received signal at a mixer injection frequency outside a bandwidth of a fundamental frequency of the received signal.

Atkinson discloses mixing the input RF signal with a local oscillator signal (34) that is at the same frequency (1.8 GHz) as the input RF signal. While the oscillator (38) of Atkinson has a frequency (.135 GHz) that is different than the input RF signal frequency (1.8GHz), the mixer frequency (34) of Atkinson is not outside a bandwidth of a fundamental frequency of the received signal. Atkinson, paras. [0011 & 0019-20]. Mouly et al. are silent in this regard. Claim 11 is thus patentably distinguished over Atkinson and Mouly et al.

#### Discussion of Claim 13

Contrary to the Examiner's assertion, Atkinson and Mouly et al. do not disclose or suggest, in combination with Claim 11, "... dividing the voltage controlled oscillator output by a frequency divide ratio equal to one."

Atkinson discloses producing the local oscillator signal (43) by multiplying the oscillator (38) output by a non-integer frequency multiplier using a phase locked loop, wherein the oscillator (38) is not harmonically related to by virtue of the non-integer multiplier. Atkinson paras. [0011, 0019-

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20, 0022]. Atkinson is limited to the use of non-integers multipliers. Claim 13 is thus further patentably distinguished over Atkinson and Mouly et al.

#### Discussion of Claim 26

Claim 14 has been re-written as independent Claim 26 without the limitation on the value of the divide ratio. Atkinson and Mouly et al. do not disclose or suggest, in combination with Claim 11, a

... method in intermediate frequency and direct conversion receivers, comprising:  
receiving a signal;  
providing a mixer injection frequency by dividing a voltage controlled oscillator output by a frequency divide ratio,  
the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics;  
mixing the received signal at a mixer injection frequency derived from a VCO frequency that is outside a bandwidth of the  $n^{\text{th}}$  harmonic of the received signal,  
the frequency divide ratio  $q$  equals the harmonic number  $n$ .

Atkinson discloses mixing the input RF signal with a local oscillator signal (34) that is at the same frequency (1.8 GHz) as the input RF signal. While the oscillator (38) of Atkinson has a frequency (.135 GHz) that is different than the input RF signal frequency (1.8GHz), the mixer frequency (34) of Atkinson is not outside a bandwidth of a fundamental frequency of the received signal. Atkinson paras. [0011 & 0019-20]. Mouly et al. are silent in this regard. Atkinson and Mouly et al. also do not disclose or suggest mixing the received signal at a mixer injection frequency derived from a VCO frequency that is outside a bandwidth of the  $n^{\text{th}}$  harmonic of the received

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signal, wherein the frequency divide ratio  $q$  equals the harmonic number  $n$ . Claim 26 is thus patentably distinguished over Atkinson and Mouly et al.

#### Allowability of Claim 14

Claim 14 has been amended to depend from Claim 26. Contrary to the Examiner's assertion, Atkinson and Mopuly et al. do not disclose or suggest, in combination with the limitations of Claim 16, "...dividing the voltage controlled oscillator output by a frequency divide ratio greater than one."

Atkinson discloses producing the local oscillator signal (43) by multiplying the oscillator (38) output by a non-integer frequency multiplier using a phase locked loop, wherein the oscillator (38) is not harmonically related to by virtue of the non-integer multiplier. Atkinson paras. [0011, 0019-20, 0022]. Atkinson is limited to the use of non-integers multipliers. Claim 14 is thus further patentably distinguished over Atkinson and Mouly et al.

#### Allowability of Claim 18

Regarding Claim 18, contrary to the Examiner's assertion, Atkinson and Mouly et al. fail to disclose or suggest, in combination with the limitations of Claim 11, "... mixing the received signal at a mixer injection frequency outside a channel bandwidth of the received signal."

Atkinson merely provides a VCO frequency (38) that is not harmonically related to the frequency of the input RF signal, without regard to whether or not the mixer injection frequency (34) is outside the bandwidth of

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the input RF signal. Claim 18 is thus further patentably distinguished over Atkinson and Mouly et al.

#### Discussion of Claim 24

Atkinson and Mouly et al. fail to disclose or suggest a

... method in intermediate frequency and direct conversion receivers, comprising:

providing a mixer injection frequency at a frequency different than the receive frequency by dividing a voltage controlled oscillator output by a frequency divide ratio,

the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics.

In Atkinson, the mixer injection frequency (34) is the same as the received signal frequency. Only the VCO (38) of Atkinson is not harmonically related to the input RF signal. Atkinson, paras. [0019-20]. Moreover, Atkinson is silent on the relationship between the VCO frequency and the bandwidth of received signal harmonics. The Examiner's assertion otherwise is not support by the prior art. In Atkinson, the VCO frequency may be within or without the received signal harmonics. Atkinson specifically states that the mixer injection frequency (34) is the same as the input REF signal frequency by virtue of the non-integer multiplier. Mouly et al is silent in this regard. Claim 24 is thus patentably distinguished over Atkinson.

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## Allowability of Claims Over Atkinson, Mouly & Freed

### Rejection Summary

Claims 15-17 stand rejected under 35 USC 103 as being unpatentable over U.S. Patent Appl. Pub. No. 2001/0039182 (Atkinson) in view of Mouly et al. and U.S. Patent No. 6,487,419 (Freed).

### Allowability of Claim 27

Original Claim 15 was re-written as independent Claim 27. Regarding Claim 27, Atkinson, Mouly et al. and Freed do not suggest

... method in intermediate frequency and direct conversion receivers, comprising:  
receiving a signal;  
providing a mixer injection frequency by dividing a voltage controlled oscillator output by a frequency divide ratio,  
the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics;  
determining a condition of the received signal;  
mixing the received signal at the mixer injection frequency derived from a voltage controlled oscillator frequency that is outside the bandwidth of the harmonics of the received signal only if the condition of the received signal is above a threshold.

The Examiner concedes that Atkinson and Mouly et al. do not disclose the limitation of Claim 15, and the Examiner cites Freed to make up the deficiency. Freed, however, discloses adjusting the gain of an amplifier associated with a mixer and a third order LNA intercept based on received signal strength. Freed does not disclose or suggest conditional mixing, i.e.,

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mixing the received signal "... only if a condition of the received signal is above a threshold." Freed does not disclose or suggest conditional mixing. Claim 27 is thus patentably distinguished over Atkinson, Mouly et al. and Freed.

#### Allowability of Claim 16

Regarding Claim 16, Atkinson, Mouly et al. and Freed fail to disclose or suggest, in combination with the limitations of Claim 11,

... determining the condition of the received signal by determining a strength thereof.

Contrary to the Examiner's assertion, neither Atkinson, Mouly et al. nor Freed disclose or suggest conditional mixing, and therefore there is no reason for either reference to suggest "... determining the condition of the received signal..." as recited in Claim 16. Claim 16 is thus patentably distinguished over Atkinson and Freed.

#### Allowability of Claim 17

Regarding Claim 17, neither Atkinson, Mouly et al. nor Freed disclose or suggest, in combination with the limitations of Claim 11,

... determining the condition of the received signal by determining a signal strength and bit error rate (BER) thereof, increasing a gain of the received signal before mixing if the gain of the received signal is below a gain threshold.

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Contrary to the Examiner's assertion, Atkinson, Mouly et al. and Freed all fail to disclose or suggest conditional mixing, and therefore there is no reason for either reference to suggest "... determining the condition of the received signal..." and "... increasing gain ..." as recited in Claim 16. Claim 17 is thus patentably distinguished over Atkinson and Freed.

### Allowability of Claims Over Arpaia

#### Rejection Summary

Claims 19 & 25 stand rejected under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,192,225 (Arpaia).

#### Allowability of Claim 19

Regarding Claim 19, contrary to the Examiner's assertion, Arpaia fails to disclose or suggest a

... method in an RF receiver, comprising:  
receiving a signal within a passband of a pre-selection filter of the receiver;  
mixing the received signal at a mixer injection frequency outside the passband of the pre-selection filter;  
chopping the received signal before and after mixing at the same chopper frequency,  
the chopper frequency proportional to the mixer injection frequency.

Arpaia does not mix the received signal with "... a mixer injection frequency outside the passband of the pre-selection filter..." In Arpaia, the frequency  $f_0$  of the local oscillator (4) (mixer injection frequency) is the same as



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the carrier frequency of the received signal. Arpaia, col. 4, lines 6-8. Arpaia changes only the phase (not the frequency) of the local oscillator signal. In Arpaia, the frequency of the switching oscillator (7) is greater than the bandwidth of the preselector filter. Arpaia, col. 4, lines 47-50 & lines 63- 67. The switching oscillator of Arpaia, controls the chop rate, not the mixer injection frequency.

Arpaia also fails to chop the received signal at a "... chopper frequency proportional to the mixer injection frequency." In Arpaia, the inverters 9, 9' "chop up" second order products (harmonics) by switching the polarity of the signal at the same rates as the switching oscillator (9). Arpaia, col. 4, lines 40-44. In Arpaia, the local oscillator (40) and the switching oscillator (7) are separate oscillators, and there is no implication that the frequencies thereof are proportional. Claim 19 and dependent Claims 20-21 are therefore patentably distinguished over Arpaia.

#### Allowability of Claim 25

Regarding independent Claim 25, contrary to the Examiner's assertion, Arpaia fails to disclose or suggest a

... method in an RF receiver, the method comprising:  
receiving a signal within a passband of a pre-selection filter of the receiver;  
mixing the received signal at a mixer injection frequency outside the passband of the pre-selection filter;  
chopping the received signal at a chopper frequency proportional to the mixer injection frequency.

In Arpaia, the frequency  $f_0$  of the local oscillator (4) (mixer injection frequency) is the same as the carrier frequency of the received signal.

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Arpaia, col. 4, lines 6-8. Arpaia changes only the phase (not the frequency) of the local oscillator signal. In Arpaia, though the frequency of the switching oscillator (7) is greater than the bandwidth of the preselector filter, the switching oscillator is not the same as the mixer injection frequency. Arpaia performs chopping at the same rate as the switching oscillator. Claim 25 is thus patentably distinguished over Arpaia.

### Allowability of Claims Arpaia & Freed

#### Rejection Summary

Claims 20 and 21 stand rejected under 35 USC 103 as being unpatentable over U.S. Patent No. 6,192,225 (Arpaia) and U.S. Patent No. 6,487,419 (Freed).

#### Allowability of Claim 20

Regarding dependent Claim 20, neither Arpaia nor Freed disclose or suggest "... increasing a gain of the received signal before mixing if the received signal gain is below a threshold" in combination with the limitations of Claim 19. Claim 20 is thus further patentably distinguished over Arpaia and Freed.

#### Discussion of Claim 21

Regarding Claim 21, neither Arpaia nor Freed disclose or suggest, in combination with the limitations of Claim 19,

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... mixing the received signal at the mixer injection frequency outside the passband of the pre-selection filter when the measured gain is above a threshold, mixing the received signal at a mixer injection frequency within the passband of the pre-selection filter if the measured gain is below the threshold.

Contrary to the Examiner's assertion Arpaia and Freed do not conditionally mix the received signal with a mixer injection frequency that is either within or without the pass band of a pre-selection filter dependent on gain. In Arpaia, the frequency  $f_0$  of the local oscillator (4) (mixer injection frequency) is the same as the carrier frequency of the received signal. Freed discloses adjusting the gain of an amplifier associated with a mixer and a third order LNA intercept based on received signal strength. Claim 21 is thus patentably distinguished over Arpaia and Freed.

### **Allowability of Claims over Arpaia, Atkinson & Mouly et al.**

#### **Rejection Summary**

Claims 22 and 23 stand rejected Under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,192,225 (Arpaia) in view of U.S. Patent Appl. Pub. No. 2001/0039182 (Atkinson) and Mouly et al.

#### **Allowability of Claim 22**

Claim 22 has been amended to include the limitations of Claim 23, Regarding independent Claim 22, contrary to the Examiner's assertion, Arpaia, Atkinson and Mouly et al. fail to disclose or suggest a

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... method in intermediate frequency and direct conversion receivers, comprising:  
    chopping a received signal;  
    mixing the received signal after chopping at a mixer injection frequency;  
    providing a mixer injection frequency derived from a voltage controlled oscillator frequency outside a bandwidth of received signal harmonics by dividing a voltage controlled oscillator output by a frequency divide ratio,  
    a harmonic of the received signal corresponding to the divide ratio of the frequency divider.

In Arpaia, the frequency  $f_0$  of the local oscillator (4) (mixer injection frequency) is the same as the carrier frequency of the received signal. Arpaia, col. 4, lines 6-8. Arpaia does not multiple the local oscillator output by any factor. Arpaia changes only the phase (not the frequency) of the local oscillator signal. Atkinson multiplies the frequency  $F_3$  of the VCO 38 by a non-integer factor ( $4/3$ ) selected so that the mixer injection frequency (34) is equal to the frequency of the input RF signal. See Atkinson, para. [0019]. There is no disclosure or suggestion in Arpaia, Atkinson or Mouly et al. that the non-integer factor is related to a received signal harmonic. Claim 22 is thus patentably distinguished over Arpaia, Atkinson and Mouly et al.

### **Prayer for Relief**

Claims 1-10 stand allowed. Kindly withdraw the rejections of claims, in view of the discussion and amendments above, and allow the Claims to issue in a United States Patent without further delay.

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Respectfully submitted,

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